



3.5“ Display System

Operating Manual



EMTrust GmbH – 85258 Weichs – Gewerbering 1

computers you can trust

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## Reshipment

If you return the ANDROX® system to EMTrust please remove all connections and peripheral equipment.

Protect the unit through a suitable packaging, preferably use the original packaging.

## Packaging

The ANDROX® system is in a protective package to avoid damage during transport.

This protective package should be environmental friendly recycled after use.

## Disposal of Device



At the end of the lifetime please dispose and/or recycle the components of the device accordingly.

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## Used symbols



Marks warnings which you should follow for your own safety and the safety of others.

The attention to those warning notices preserves the ANDROX® system from damages.



Provides information for the optimum use of the ANDROX® system.

## Tips to the operating instructions



The tips and information in the segment „Safety“ are to be followed for the purposes of the device security and for your own protection.

You will find a quick overview of the ANDROX® system in the columns „operating elements“ and „plug allocation“.

The service of the ANDROX® system is described in the categories:

- General information
- Connectors and pin assignment
- ANDROX® with Android™ / create micro SD card, preparation and start up, create application
- ANDROX® with Yocto Linux / create micro SD card, preparation and start up
- Temperature sensor

At the end of these operating instructions there are the „technical data“, as well as a listing of concept explanations for the ANDROX® system.

These operating instructions belong to the ANDROX® system and should be kept in handy nearness for the operator.

The manufacturer assumes no liability for damages and operational disturbances which arise from the nonobservance of these operating instructions.

## Safety of People

 At the place of installation the current safety regulations as well as all other measures of safety must be applied.

For the duration of the installation no electrical power should be applied to the device.

The connector X18 is able to handle voltages up to 250VAC or 220VDC. If voltages higher than the maximum supply voltage of the device (8-28VDC) are used at this connector, the connection must only be made by professional experts.

 Do not disassemble the screen. You could receive an electric shock.

## Device Safety

 The ANDROX® system works exclusively within the given DC voltage range.

Repair work can only be performed by an authorized / certified specialist supplier or from

the manufacturer-customer service personnel. This is to be particularly important during the warranty period.

The warranty will be voided for changes in the ANDROX® system which were not approved by the manufacturer.

Dust, dirt, humidity and extreme temperatures can affect the flawless function considerably.

Do not open the device to prevent damages. No internal parts can be changed or serviced by the user.

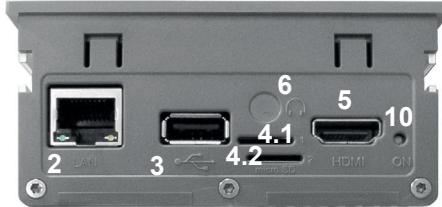
## Purpose

ANDROX® is a 3.5“ touch screen system for low-voltage range. It was designed for the installation in a switchboard or frame. The front-side is IP65 protected.

The main field of use is the supervision, measurement or control of objects and peripheral devices, as well as the storage and transfer of information.

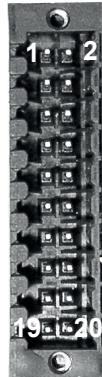
## Operating Elements and Interfaces

- 1 - **TFT** Touchscreen 3,5“
- 2 - **LAN** Ethernet 10/100/1000 Mbits/s (RJ45)
- 3 -  **USB 2.0** Type A female connector / Host Port
- 4 - **microSD** 2.0 Card Slot (2x)
  - 4.1 Slot 1 (operating system)
  - 4.2 Slot 2 (optional data)
- 5 - **HDMI** 1.4
- 6 -  **No use**
- 7 - **X19** IO connector for temperature sensor, RS485, RS232, CAN, GPIO, PVIN, PWM, Power
- 8 - **X18** 2x Switch-Relay
- 9 -  **USB 2.0** Mini-B female connector / on-the-go
- 10 - **ON** Switch / System switch on/off



## Pin Assignment X19

Pin	Signal	Description
1	THERM_SENSE_N	Temperature Sensor
3	THERM_SENSE_P1	
5	RS485_RX_P	Serial Interface 2
7	RS485_RX_N	
9	RS232_RXD	Serial Interface 1
11	RS232_RTS_m	
13	GPO_0	Open drain, High max. Vin, 5mA
15	GPO_1	
17	GND_IN	DC -
19	PVIN	DC +



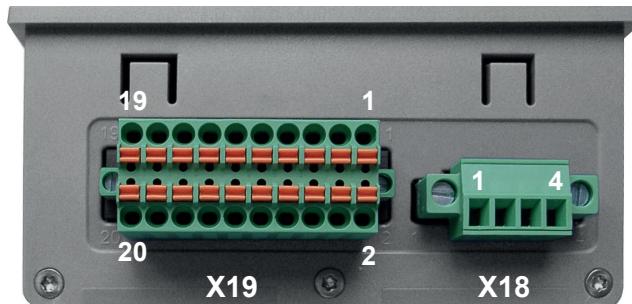
## Pin Assignment X19

Pin	Signal	Description
2	THERM_SENSE_P2	Temperature Sensor
4	PWM_OUT	OD, High max. Vin, 5mA
6	RS485_TX_N	Serial Interface 2
8	RS485_TX_P	
10	RS232_RXD	Serial Interface 1
12	RS232_CTS_m	
14	GPI_0	Low max. 3V, High max. Uin
16	GPI_1	
18	CAN_P	High speed CAN,1Mb/s
20	CAN_N	

## Pin Assignment X18



Pin	Signal	Description
1	Relay 1	220VDC, 250VAC, 2A max, no fuse - input fuse necessary
2	Relay 2	220VDC, 250VAC, 2A max, no fuse - input fuse necessary
3		
4		



## Installation Location

 If the access to the interfaces of the ANDROX® system is not accessible after the installation, all necessary connections are to be made before the installation. Also the microSD Cards must be inserted during the installation process. Follow also the tips in the installation instructions.

 The electric connections must be made while the device is not connected to power.

## Switch the system on/off

The ANDROX® System has an on/off-button. To switch on push the button 0,5 seconds, to switch off push the button 5 seconds.

In the switched on state (Default setting at delivery) you can turn on/off the system over the power supply. If you turn off over power supply make sure by your programming or system con-

figuration that it comes to no data loss.

## Touchscreen

The service of the ANDROX® system occurs with the touchscreen. The function is operated by touching the screen.

 The screen is not scratch-resistant! Therefore, don't use sharp or hard input tools.

 Alternatively a suitable input pen can be used.

## Operating System and micro SD Card

The ANDROX® System uses Android™ or Yocto Linux. The operating system must be installed on mSD card and is used in the ANDROX® system in the mSD slot 1.

The optional EMTrust mSD cards, which need to be ordered separately, are available for Android™ and Yocto Linux.

We recommend to use micro SD cards class 10 or higher from EMTrust.

## **ANDROX® with Android™**

The mSD Card included the following files:

- Android™ 4.2 / Operating system
- Sample application „AppHouseControl“ (Relay operation).
- Sample application „PID-Controller“ (Thermometer function)
- Library „Platform“ for ANDROX® components.
- Readme.txt / Indication to the creation from Apps, Touch Calibration and library.
- Security file package Android™ 4.2



EMTrust provide files like example applications, operating system and others in her current state. These include no guarantee, warranty and legal claims.

## **Create a bootable microSD Card for Android™**

If you don't have the preloaded mSD card from EMTrust, it is necessary to installed the operating system on a mSD card. Co-ordinated programs and technical information for Android™ can be requested from „[androx@emtrust.de](mailto:androx@emtrust.de)“.

To install Android™ 4.2 on your mSD Card you have to use a PC and a program like „Win32 Disk Imager“ from SourceForge® (<http://sourceforge.net>).

„Win32 Disk Imager“ install a bootable mSD-Card with Android™ 4.2.



Follow by the installation also the operating system information of your PC.

Create a folder on the system witch run „Win32 Disk Imager“. Then copie the file „android\_2gb.sdcards.zip“ in this folder and perform the following steps:

- Unpack the ZIP file in the same folder.
- Place the mSD Card in the PC.



- Run „Win32 Disk Imager“.
- In the opened „Win32 Disk Imager“ window enter the image file „android\_2gb.sdcards“ with complete path.
- Select under „Device“ the drive of the mSD Card.

Here it is important to use the right disk drive. A wrong choice can lead to a complete overrun on the well-chosen data carrier.

- Click on the button „Write“. A loading beam indicates the progress of the transfer.
- Close the PopUp-Window „Write Successful“ with „OK“. Now the mSD Card contains the operating system Android™ 4.2.

Now the mSD Card be used in the ANDROX® system.

## Prepare the ANDROX® System

- Insert the mSD Card with operating system Android™ in the mSD Interface 1.

- To transfer applications on the ANDROX® system a connection from the USB 2.0 Mini-B female plug to your PC USB connector is necessary.
- Optional put in a second mSD Card for data and similar in the mSD connector 2.
- Optional plug in a LAN cable, HDMI cable and USB cable.

## Switch on the ANDROX® System

Supply the connectors 17 and 19 on the plug X19 with 8V (min.) to 28V (max.) DC voltage.

- The bootloader stored on flash memory starts the operating system Android™ 4.2 from microSD Card.

## Android™ Screen

With symbols you can start and manage the applications on the start screen.

About symbols in the right screen area navigation are available.

 Change between Apps

 Start screen

 Back to the previous screen

Touch a menu, tap your finger to select / start them.

Wipe to move elements / displays.

## **ANDROX® System with Android™**

The system includes in the delivery state some installed Standard-Apps like,

- Browser, Clock, Downloads, E-Mail, Settings, Galerie, Calendar, Search, Clock, ...

### **and WIDGETS**

- Search, Bookmarks, Calendar, E-Mail, Photo Gallery, Power, Settings, Clock, ...

You will find operating information about standard Apps in the literature of Android™ 4.2.

Other Apps are to be installed in the form of an „APK“, because „Google PlayTM is not on the system.

Also example Apps and own generated Apps can be installed on the system.

## **Create Android™ App**

To provide your own applications for Android™, install yourselves the developing surroundings „Android Studio“ from Google Inc. on your computer. Download path:

<http://developer.android.com/sdk/index.html>

Should „Java SE Development Kit7“ (JDK™) not be installed on your PC yet, you can download it at:

<http://www.oracle.com/technetwork/java/javase/downloads/jdk7-downloads-1880260.html>

Tutorials and tips to the work with the program you find on the „Android Studio“ download page or in related literature on the subject „Android Studio“.

## Use ANDROX® Interfaces in Android™

To use interfaces specific for system (e.g., relay or temperature sensor), an application can use the library of „Platform“.

- The process is described under point 3 (Using Library) in the „Readme“ file to the ANDROX®-System with Android™.

With the help of examples the integration of the libraries is also shown.

Our example applications „AppHouseControl“ and „AppThermometer“ can be used originally or modified.

## Install Sample Application

To install the example application „AppThermometer“ on the ANDROX® system we recommend the following approach:

- Insert the microSD Card in your PC.
- Start „Android Studio“ and select in the Welcome Window „Import Non-Android Studio Projekt“.

- Select and confirm the folder with the example application „AppThermometer“ on the microSD Card with „OK“.
- Choose the target directory on your PC and confirm with „Next“.
- Don't change the defaults at the window „Import Project from ADT“ and confirm with „Finish“.
- If the mistake „failed to find target...“ appears, click the Link „Install missing platform(s) and sync project“. It opens a license window which must be accepted and be confirmed with „Next“.
- The installation starts. If all components are installed, finish the window „Installing Requested Components“ with „Finish“.

Now take the microSD Card from your PC and insert it in your ANDROX® system. Afterwards start the ANDROX® system.

To transfer the provided application on the ANDROX® system a connection from your PC to the USB 2.0 mini-B socket is necessary.

- At the „Android Studio“ workplace start the

program operation with „Run“ and after that „Run app“.

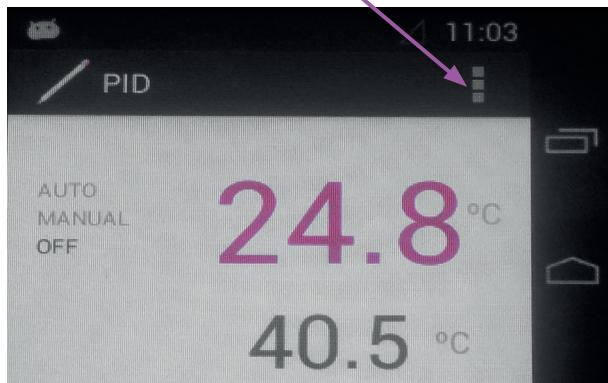
- In the ANDROX® PopUp window choose „USB debugging“ allowed. Then choose „Always allow from this“ and confirm with „OK“.
- On your PC window „Choose Device“ choose ANDROX®-System and confirm with „OK“.

The example application „AppThermometer“ is transferred on the ANDROX® system and is installed.

## Configuration Temperature Sensor

Before the sensor is connected, the configuration must be adapted by Android™.

- In application „PID“ choose „Settings“.



- Select „Wiring“ (Sensor connection).
- Select from the available possibilities the desired connection variation.
- Select „Sensor device“.
- From the choice choose the used temperature sensor.

## ANDROX® with Yocto Linux

The mSD Card included the following files:

Partition 1

- Linux Kernel.
- Devicetree.
- ANDROX® Patches.
- Readme.txt / Tips for the production of Yocto Linux

Partition 2

- Root-Files / Necessary Linux files



EMTrust makes available the files in their original state. They contain no guarantees and juridical claims.

## Create a bootable microSD Card for Yocto Linux

If you don't have the preloaded mSD Card from EMTrust, it is necessary to installed the operating system on a mSD card. Technical

information for Yocto Linux can be requested from „androx@emtrust.de“.

To install Yocto Linux on your mSD Card you use a PC and a program like „Win32 Disk Imager“ from SourceForge® (<http://sourceforge.net>) if you use Windows® and „dd“ utility if you use Linux.

Both programs provide a bootable mSD card with Yocto Linux.



For the installation, please follow the operating system information on your PC.

Take the instructions for the production of Yocto Linux from the file „Readme.txt“ under paragraph 1 „Build Yocto Linux“. Tips for transferring of the image on map SD are described under paragraph 1 Segment 9.

Now the mSD Card can be used in the ANDROX® system.

## Prepare the ANDROX® System

Insert the mSD Card with operating system Androïd™ in the mSD Interface 1.

- Insert the mSD Card with operating system in the mSD interface 1.
- Optional put in a second mSD Card for data and similar in the mSD connector 2.
- Optional plug in a LAN cable, HDMI cable und USB cable.

## Switch on the ANDROX® System

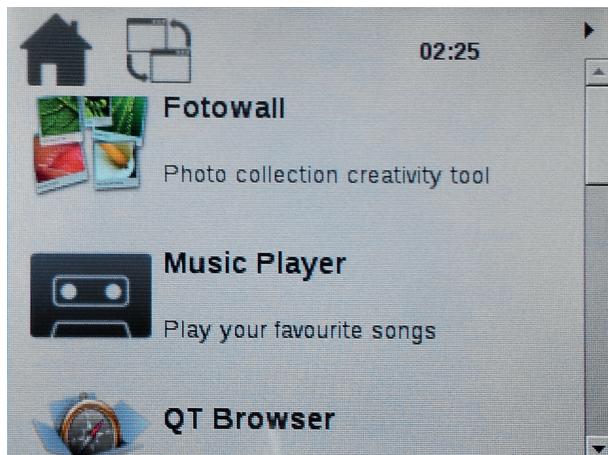
Supply the connectors 17 and 19 on the plug X19 with 8V (min.) to 28V (max.) DC voltage.

- The bootloader stored on flash memory starts the operating system Yocto Linux from microSD Card.

## Yocto Linux Screen

This Yocto Linux uses the graphic surface of Qt® Project.

Touch a desired application with the finger to select / start them.



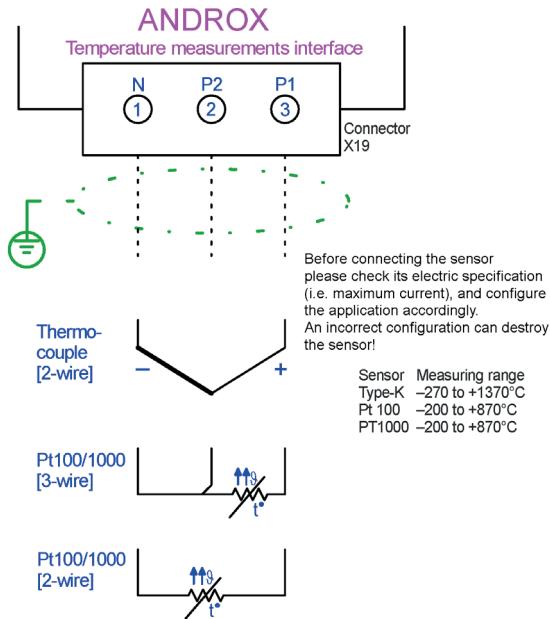
## Connecting different Temperature Sensors

The picture on the right shows connection variations of the temperature sensors. The plug allocation is described on the page 8.

## Turn off System

To turn off the system switch off the power supply, or press the „ON“ button for at least 5 seconds.

If the system is turn off over „ON“ button it must be switched on with the „ON“ button.



## Technical Data

- 3.5“ TFT-display with resistive touch sensor (touch-screen) and LED backlight
- Resolution 320x240 Pixel / 24Bit RGB
- Luminance, typical 320 cd/m<sup>2</sup>
- Processor: Freescale i.MX 6Solo, 800MHz
- Memory: 1GB DDR3L RAM, 800MT/s
- RTC / Realtime Clock with battery backup. Battery lifetime min. 5 years
- 2x microSD 2.0 card slot (Mass storage)
- Graphics Output: HDMI 1.4 (Maximum resolution 1920x1080@60Hz)
- Ethernet: 10/100/1000 Mbit/s (Gbit Ethernet is limited to maximum 480 MBit/s)
- USB 2.0 Type A female connector / Host Port
- USB 2.0 Mini-B female connector / on-the-go /Client Port
- Serial Interface: RS232 (4-pin for TxD, RxD, CTS and RTS) and RS485
- CAN Interface: FlexCAN, up to 1Mb/s
- Interface for temperature sensors (e.g. RTD and

### Thermocouple

- PWM Output, OD, High max. Vin, 5mA
- Digital Input and Output (2x IN and 2x OUT)
- Switch-Relay, max. 220VDC, 250VAC, 2A
- Power Supply: Nominal 12/24 VDC, 8 V (min) to 28 V (max)
- Ambient temperature 0°C to 60°C
- Storage temperature -20°C to 80°C
- Humidity non condensing < 75%
- Dimension approximately 96x96x47 (mm)
- Weight approximately 300 g

## Terminology

AC	Alternating Current.	RS-485	Recommended Standard-485.
CAN	Controller Area Network - Serial Network.	TFT	Thin-Film-Transistor.
COM	Serial Communication Port - Serial Interface.	TSP	Touch Screen Panel.
CPU	Central Processing Unit.	USB	Universal Serial Bus.
DC	Direct Current.		
DDR3	Third generation „Double Data Rate“ SDRAM storage technology.		
EMI	Electromagnetic Interference.		
Gigabit Ethernet	Ethernet-connection with a transfer rate up to 1000Mbit/s.		
GND	Chassis ground.		
GPIO	General-purpose input/output.		
Host	A network host or other device connected to a computer network.		
HDMI	High Definition Multimedia Interface.		
IP65	Dust tight and water jets protection.		
LAN	Local Area Network.		
LED	Light Emitting Diode.		
MicroSD	Memory card format 11x15x0,7mm.		
PWM	Pulse-Width Modulation.		
RTD	Resistance temperature detector (e.g. PT100).		
RS-232	Recommended Standard-232.		





